

IX. *An Analysis of Satin Spar from Alston Moor in Cumberland.*
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Read March 17th, 1812.

THE extraordinary lustre of the mineral well known at present under the appellation of "Satin Spar*," added to certain other circumstances in its external character, induced me to suppose that its chemical constituents were not, as commonly believed, a simple combination of carbonic acid with lime, but that it contained some other ingredient. I resolved, therefore, to undertake a careful analysis of this substance; and as the result has confirmed my conjecture, an account of the process, and the proportions of its component parts, may not prove uninteresting to the Linnean Society, of which I have the honour to be a member.

1. A small specimen of very pure satin spar, which weighed 20 grs., was placed on a piece of iron heated to redness, in order to drive off any water which it might contain.

2. After the specimen had been in this situation for a few minutes, it was taken thence, and again weighed whilst glowing with heat. It was then ascertained that the weight of the sub-

* This mineral has been accurately described by Mr. A. Aikin, and also analysed by Mr. H. Pepys jun. but his analysis differs materially from mine.—*Phil. Mag.* vol. xii.

stance was the same, and consequently that no water existed in its composition.

3. The same piece of satin spar was put into the bowl of a tobacco-pipe, which had a cover fitly adapted to it, and exposed to a red heat for the space of an hour and a half. It had by this time assumed a black appearance, and weighed, when immediately transferred from the crucible to the scales, 11.25 grs. of its original weight, or per cent. 56.25 grs. The weight of the carbonic acid expelled will, therefore, amount to 8.75 grs., or per cent. 43.75 grs. This experiment was repeated, and the result was the same.

4. After this the 11.25 grs. were dissolved in muriatic acid (but without effervescence) in a crucible of platinum, and placed before the fire until the volatile part was entirely evaporated. The crucible was then kept in a red heat for such a length of time, that the substance in it was fused, and afterwards, when cooled down to the temperature of the surrounding medium, became a hard, solid body of a black colour. Water was then added, which readily dissolved the muriate of lime contained in the mass, but had no effect on the other part; viz. the black coloured substance. When the insoluble part had subsided to the bottom, the clear liquor was drawn off by means of a syphon, and its place again supplied with pure water. This operation was repeated so frequently, that when with the last decanted portion of water a solution of the carbonate of soda was mingled, no precipitate was occasioned by it.

5. The black-coloured substance above mentioned being thus obtained apart, was folded up in a clean thin leaf of platinum, and heated red-hot for a short time, and when weighed as soon as taken from the fire, afforded at the rate of 2.6875 grs. per cent, after allowing for the weight of the platinum.

6. A small piece of this substance, together with borax, being exposed to the flame of a candle, urged by the blow-pipe, and melted, the borax exhibited the presence of manganese by its purple colour. No iron could be detected in combination with this oxide. Deducting, therefore, the 2.6875 grs. of the oxide of manganese from 56.25 grs., the remainder, viz. 53.5625 grs., will be the quantity of lime in 100 grs. of the substance analysed.

The following then, according to this analysis, are the proportions of the constituent parts in 100 grs. of pure satin spar, viz.

| | Grs. |
|--------------------------|-----------|
| Lime - - - - - | = 53.5625 |
| Black oxide of manganese | = 2.6875 |
| Carbonic acid - - - - - | = 43.7500 |
| | ————— |
| | 100 grs. |

After the great number of experiments which I have made on pure carbonate of lime, I have reason to conclude, that in 100 grs. of this substance, the lime = 55.9375 grs., and the carbonic acid = 44.0625 grs. Hence 100 grs. of pure satin spar contain

| | Grs. |
|----------------------------------|----------|
| Carbonate of lime - - - - - | = 95.75 |
| Carbonate of manganese - - - - - | = 4.25 |
| | ————— |
| | 100 grs. |

St. Peter's College, Cambridge,
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